

REMARKS

This amendment is submitted to be fully responsive to the Office Action mailed December 17, 2002. Applicant submits that no new matter has been added by this amendment and that support for the claims as amended may be found throughout the specification and drawings. Accordingly, reconsideration and allowance of the pending claims is respectfully requested.

With this amendment claims 1-4, 6-7 and 9-12 are all pending and claims 5 and 8 have been cancelled.

Independent claim 1 has been amended to include further limitations that Applicant believes precludes a finding of obviousness in view of the cited prior art. Particularly, claim 1 has been amended to include the limitations of cancelled claims 5 and 8 wherein claim 1 now recites a vehicle guidance apparatus comprised of a GPS receiver for periodically receiving vehicle position data and a radio modem for receiving positional correction factor data; and relative position determining means mounted on said vehicle for generating relative positional data signals applicable to time periods between receipt of vehicle position data. Additional language has also been included in claim 1 for the purpose of putting the claim in better condition for allowance.

35 U.S.C. §103(a)

Claims 1-3 and 6 are rejected under 35 U.S.C. §103(a) as being unpatentable over Keller et al. (5,987,383) in view of Dano (4,398,195). Applicant respectfully traverses with this as a basis for rejection.

The invention as claimed now specifically includes the feature of relative position determining means for generating relative positional data signals applicable to time periods between receipt of vehicle position data. Applicant submits that none of the references relied on by the Examiner either alone or in combination discloses or renders obvious the claimed

vehicle guidance apparatus that includes this feature. The Applicant submits that it was not obvious at the time of making the invention to combine such relative position determining means with a GPS receiver into an apparatus for guiding an agricultural vehicle. The priority document for the application was filed on 27 October 1998 in Australia. Around the time the invention was made, GPS based positioning systems utilizing correction data from a base station were known. Particularly, real-time kinematic corrected GPS receivers provided an extremely high level of accuracy which in some cases was less than 10 centimeters. However, although corrected GPS position data was capable of pinpointing the instantaneous location of an object to such a high degree of accuracy, in the case of an object in motion, such as an agricultural vehicle, this system could not provide the same accuracy with respect to the position of the object in relation to a path thus limiting the ability to correct the actual path of the object. The source of the limitation of accuracy in following a path arises as a consequence of the speed of the vehicle and the inherent position update frequency of the GPS system.

Applicant's invention as claimed combines a correction data receiving GPS receiver with relative position determining mean to calculate position data for time periods between when GPS updates are received. This combination of fairly "low-end" relative position determining means and a "high-end" GPS system has resulted in a product of improved accuracy and performance about a path that was unexpected in light of the teachings of the prior art. Inertial navigation systems have been used for GPS systems; however, they were either used to correct the GPS data itself or were used to provide approximate position data when GPS systems were out of range.

There is a particular synergy between the highly accurate GPS readings, the "low end" inertial navigation system, the guidance means and the processor of the Applicant's system that produced a result that was unexpected in light of the prior art. Essentially, prior

art systems employing a GPS receiver and guidance means only allow for “discrete” corrections to the vehicle path upon the receipt of each update of GPS position data. In contrast, the elements of Applicant’s system allow for a *continuous* process of position determination and path correction. In fact, the controllable steering means was specifically developed to automate the process of path correction as it was found that a human operator could not provide sufficient steering accuracy to fully exploit the guidance capabilities of the system.

The Keller patent broadly describes a system that computes vehicle paths using an existing vehicle path and real-time path information. The path as calculated is then used as a basis for subsequently generating paths. (See column 2, lines 10-15 and column 3, lines 1-24.)

Keller immediately teaches away from the invention claimed by the Applicant in that there is no need for the calculation of position data between GPS updates. The basis behind the Keller system is to take into account real-time events such as the navigation around obstacles (see in particular Figure 6). Position data between GPS updates is not required as it could very well be overwritten by real-time data entered by an operator. There is thus no motivation to alter Keller to include relative position determining means as provided in the claimed invention.

The use of inertial navigation systems is disclosed in Keller at column 4, lines 16-19. However, as noted above, they are disclosed in the context of supplementing GPS based systems where the satellite based positioning signals are not available. There is no teaching or suggestion to use an inertial navigation system to provide position data between GPS updates. Finally, at column 5, lines 49-54 the use of real-time kinematic corrections is disclosed which is said to provide centimeter level accuracy. As discussed above, this is a teaching away from the use of a low-end inertial navigation system to provide position data

between GPS updates particularly in a ground-based agricultural contest. There would be no expectation of success in incorporating relative position determining means into such a system. As such, Applicant submits that an obviousness rejection cannot be sustained in view of the above-identified prior art and respectfully requests that this be withdrawn as a basis for rejection.

Claim 4 is rejected under 35 U.S.C. §103(a) as being unpatentable over Keller et al. and Dano in further view of Keller et al. (6,087,984).

Applicant has amended independent claim 1 to include further limitations that are not taught or suggested by the above-cited references and as such is now in condition for allowance. Accordingly, all claims that depend from claim 1 are also believed to be in condition for allowance. As such, Applicant respectfully requests reconsideration of claim 4 in view of the above remarks regarding non-obviousness.

Claims 7 and 10-12 are rejected under 35 U.S.C. §103(a) as being unpatentable over Keller et al. and Dano in further view of Winslow (6,314,348).

Applicant respectfully submits that independent claim 1 as amended includes limitations previously recited in the cancelled dependent claims 5 and 8 which are not taught or suggested by the above-cited prior art and as such an obviousness rejection cannot be sustained. Accordingly, Applicant respectfully requests reconsideration of claims 7 and 10-12 in view of the foregoing remarks as claim 5 has been cancelled.

Claim 8 is rejected under 35 U.S.C. §103(a) as being unpatentable over Keller et al., Dano and Winslow in further view of Lestrade (4,558,760). Applicant has amended independent claim 1 to the limitations of now cancelled claims 5 and 8.

The '760 reference is relied on as disclosing a relative position determining means with regard to cancelled claim 8. In the first instance, Applicant disagrees that the relative

position determining means, in the sense of means for calculating a change in position relative to the most recently received GPS update, is disclosed in this document.

The system of the '760 reference is purely ground based (see Figure 2) and operates by continuously monitoring the angle of a steering arm through the use of a potentiometer and electronically comparing the potentiometer output with a prestored value representing the desired direction of travel (see generally column 5, lines 53-62).

Lestradet thus discloses the use of a signal comparison for each path traveled by the vehicle. There is no disclosure of any means for determining position data for the vehicle in between the times of periodic receipt of positioning data from an external source.

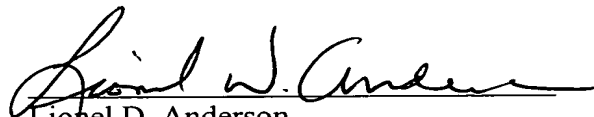
Applicant reiterates the foregoing discussion of the present invention being nonobvious in view of the present prior art which does not teach or suggest such relative position determining means to an apparatus as claimed. It is appreciated that in determining the differences between the prior art and the claims, the question under 35 U.S.C. §103 is not whether the differences themselves would have been obvious but whether the claimed invention as a whole would have been obvious. Applicant submits that amended independent claim 1 as a whole is not taught or suggested by the combination of Keller et al. with Dano and Winslow and further in view of Lestradet. Accordingly, Applicant respectfully requests that this be withdrawn as a basis for rejection.

Claim 9 is rejected under 35 U.S.C. §103(a) as being unpatentable over Keller et al., Dano, Winslow and Lestradet in further view of Kyrtos et al. (5,375,059). The '059 reference is relied on as disclosing the use of an accelerometer. Broadly, the '059 reference discloses a vehicle positioning system composed of a combination of a GPS system and a motion positioning system (see generally Figure 1), with the accelerometer forming part of the motion positioning system.

The system described in the '059 reference, however, is an example of a system described above where an inertial navigation system is used to correct position data received from a GPS satellite (see column 6, lines 3-14; claim 1 and Figure 10). There is no disclosure or suggestion of utilizing the accelerometer to provide position data for time periods between receipt of GPS data. Moreover, the "high-end" nature of the inertial navigation system in the '059 reference is required for it to provide accurate corrections to the position data received from the GPS system (see column 29, line 36). Indeed, in some cases the GPS data may be disregarded altogether (see column 29, line 34). Applicant submits that the present invention would not have been obvious in view of this cited prior art and as such respectfully requests that this be withdrawn as a basis for rejection.

From the foregoing amendments and remarks in response to the above-identified Office Action, Applicant believes the claims as amended are in condition for allowance and such action toward these ends is respectfully requested.

Respectfully submitted,



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